

Claims

1. Apparatus for the measurement of the total internal resistance of fuel cells and fuel cells stacks comprising an electronic load system which comprises
  - an input unit generating an input pulse
  - a driver for the control of the input pulse
  - a MOSFET module comprising at least one MOSFET device for the generation of a short circuit in a fuel cell
  - a bank of selectable resistorsand a measuring circuit which comprises
  - a shunt for converting the fuel cell voltage into a current signal
  - differential amplifiers for the current and the voltage signals
  - a data acquisition system which receives the voltage and the current signals obtained by the differential amplifiers.
2. Apparatus according to claim 1,  
**characterised** in that said MOSFET module produces short circuit pulses of 0.1 to 100 msec.
3. Apparatus according to claim 1 or 2  
**characterised** in that the bank of selectable resistors is connected in series with the fuel cell.

4. Apparatus according to the claims 1 to 3,  
characterised in that active differential probes are included in all the signal connections for the reduction of ambient noises.
5. Apparatus according to the claims 1 to 4,  
characterised in that all connections and resistors are low inductive.
6. Apparatus according to the claims 1 to 5,  
characterised in that the load elements are connected to a safety system that limits current when local temperatures become too high.
7. Method for the measurement of the total internal resistance of fuel cells and fuel cells stacks comprising the following steps:
  - generating an input pulse
  - causing a short circuit in the fuel cell by means of a MOSFET module
  - taking the potential measurement of the cell for resistance calculation when the circuit gets closed
  - obtaining the cell current signal by means of a shunt
  - sending the voltage and the current signals to an acquisition system.

8. Method according to claim 7,  
**characterised** in that the reactance effect on response is enhanced by a bank of resistors.
9. Method according to claim 7 or 8,  
**characterised** in that the MOSFET module remains active even by the application of the voltage of a single fuel cell.
10. Method according to the claims 7 to 9,  
**characterised** in that the noise effects on measurement errors are reduced by means of the high current obtained.
11. Method according to the claims 7 to 10,  
**characterised** in that current pulse trains are generated with ON/OFF ratio and operating frequency settable by operator.